

High Resolving Power Volume Diffractive Gratings for 400-2700 nm Spectral Range, Phase II

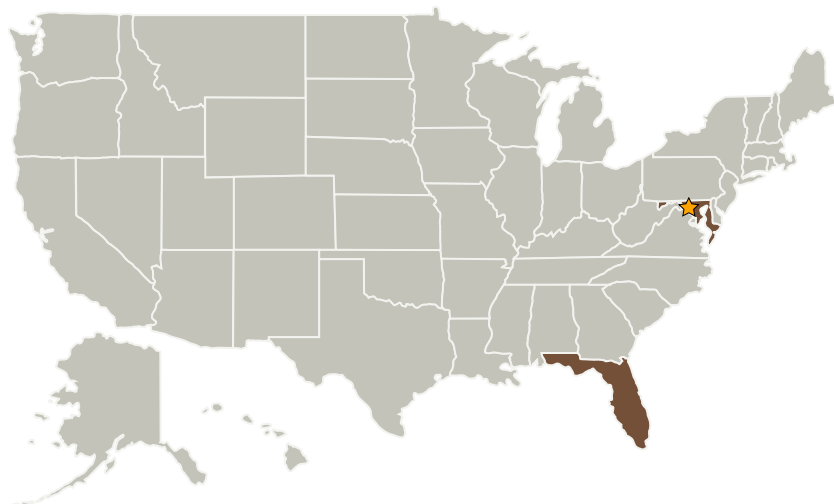
Completed Technology Project (2007 - 2009)



Project Introduction

The main purpose of this NASA SBIR Phase II proposal is development of a novel type of high resolving power diffraction gratings based on volume Bragg gratings technology. The key innovation, which was used for creation of these gratings, is based on patented technology of production of high efficiency volume diffractive elements in photo-thermo-refractive (PTR) glass on which OptiGrate has an exclusive license from the University of Central Florida. The significance of the innovation is that volume diffractive gratings in PTR glass have diffraction efficiency more than 95% and resolving power up to 20,000 in spectral range from 400 to 2700 nm. These gratings have 25 mm-long standard aperture with possibility to increase it up to 50 mm with the spectral resolution less than 50 pm. This, to the best of our knowledge, exceeds parameters of all comparable gratings worldwide. Moreover, as a result of Phase I project performance, a combination of high resolution Bragg grating with Fabri-Perot etalon provides additional increasing of spectral selectivity and enables the further increasing of spectral resolution power. This approach will be used for development of narrow band filters for detection of O₂ (766 nm), H₂O (935 nm), CO₂ (1571 nm) and CH₄ (1650 nm) with spectral width well below 1 nm (100 -- 200 pm), aperture 25 mm, throughput exceeding 90% in both reflecting and transmitting geometries. An additional task in Phase II would be a development of a scanning technology within a narrow line about 100 pm with resolution in the range from 1 to 10 pm. Aperture 25 mm, selected radiation should be focused to a photoreceiver of about 200 μ m.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
OptiGrate Corporation	Supporting Organization	Industry	Orlando, Florida

Primary U.S. Work Locations	
Florida	Maryland

Project Transitions

**March 2007:** Project Start**September 2009:** Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes